and delaying vessels. 24th.—High seas and heavy gales caused great damage along the middle Atlantic coast. During a heavy storm with high northwest wind, a small vessel was blown ashore on Long Island Sound, a steam yacht was wrecked, and considerable damage was done along the Long Island coast and on the Sound. At Block Island, R. I., the wind reached a velocity of 78 miles per hour at 9.08 p. m. No vessels left the harbor; several broke from their moorings, and two sunk. At Boston, Mass., the wind reached a velocity of 48 miles per hour from the northeast, with heavy seas, and considerable damage was done to shipping, wharfage, and seaside property in that section. 24–25th.—A northeast gale, with rain, commenced at Vineyard Haven, Mass., the night of the 24th and continued until 11 a. m., 25th, causing damage to hotel property, washing away bathing houses, and prostrating the telegraph line. The approach to the gauges and anemometer of the Signal Office was torn away. 26th.—A heavy wind and thunder-storm occurred at Cape Henry, Va., in the afternoon. At Cleveland, Ohio, high wind, with rain and small hail, prevailed. A loaded lumber barge was wrecked on the breakwater; one of the crew was drowned. 29th.—High wind, with rain and small hail, prevailed at Cleveland, Ohio, during the evening. A schooner went ashore inside the west breakwater.

WATER-SPOUTS.

Four water-spouts were observed 6 miles wnw. from Key West, Fla., between 5.20 and 5.45 p. m., 2d. One spout continued about 20 minutes. Another, somewhat larger, developed at 5.35 p. m., and, although it extended but half-way down, churned the water beneath it to a considerable height. Down the centre of these spouts a light or transparent core was observed. The other two spouts were in the first stages of formation, and were consequently very small. One extended from the base of the cloud towards the southwest at an angle of 45°, and the other curved towards the northeast at an angle of 35°. On the 19th, at 3.30 p. m., a water-spout formed during a storm near the new light-house, 5 miles from New Haven, Conn., and moved rapidly westward along Long Island Sound. It then moved eastward. A water-spout was seen later at Milford, about 10 miles distant. It was a huge black mass 200 to 400 feet in height and about 25 feet in diameter. As it moved westward it diminished in diameter. The gyration of the spout was very rapid, and the water in its vicinity was greatly agitated. Three water-spouts were observed moving from west to east two miles south of Hatteras, N. C., at 2.20 p. m. of the 26th. One extended from cloud to sea, and was complete, and the others were only partly formed and hung downward from the clouds

Storms at Palmetto, Nev., August 7 and 11, 1890.

On the 11th two intensely black thunder clouds appeared over the crests of the surrounding mountains, one approaching from the north, and the other from the east. A short distance from Palmetto these clouds seemed to join, and rushed with extraordinary swiftness towards Palmetto. The resultant cloud was riven with lightning, and the air became filled with a terrific roar above which the thunder was hardly audible. A column of water poured down, excavating a trench about 500 feet long, and, in places, 7 feet deep and 20 feet in width. Within 10 minutes the entire lower part of the Palmetto Valley was 2 to 3 inches under water, and the cañon leading to Fish Lake Valley was a torrent. The stage road was obliterated for 9 miles, although the rainfall extended but little beyond Palmetto.

The storm of the 7th was very similar to that of the 11th, except that the rain seemed to come from one cloud, only. This cloud appeared to touch the ground and roll down the mountain side, and the rain covered a greater area.

ATMOSPHERIC ELECTRICITY.

AURORAS.

Auroras were reported as follows: 1st, Mount Saint Mary's, Md.; Wilkes Barre, Pa. 4th, New Haven, Mo. 5th, New Hartford and Southington, Conn.; Eastport and Orono, Me.; Cambridge, Fall River, and Newburyport, Mass.; Berlin Mills, Hanover, Manchester, and Nashua, N. H.; Madison, N. J.; Lowville and New Lisbon, N. Y.; Eagle's Mere, Pa.; Flandreau and Wolsey, S. Dak.; Hartland, Vt. 8th, Tatoosh Island, Wash. 9th, Wolsey, S. Dak. 10th, Mount Saint Mary's, Md. 13th, Eastport, Kent's Hill, and Orono, Me. 14th, Glendive, Mont. 16th, Seymour, Ind. 17th, New Hartford, Conn.; Lacon, Lincoln, Louisville, Riley, and Rushville, Ill.; Angola and Seymour, Ind.; Afton, Alta, Amana, Bancroft, Cresco, and McCausland, Iowa; Barren Creek Springs, Md.; Amherst, Royalston, and Somerset, Mass.; Alpena, Detroit, Lansing, Manton, Marquette, Sault de Ste. Marie, and Thoruville, Mich.; Glendive, Mont.; Nashua, N. H.; Beverly, Egg Harbor City, Madison, Moorestown, and Rancocas, N. J.; Buffalo, Ithaca, Lowville, New Lisbon, and Oswego, N. Y.; Fort Buford, N. Dak.; Bangorville, Bement, Lordstown, and North Lewisburgh, Ohio; Erie, Coatesville, Grampian Hills, Eagle's Mere, Le Roy, and Nisbet, Pa.; Block Island, R. I.; Rapid City, S. Dak.; Embarrass, Wis. 18th, Grampian Hills, Pa.; Rapid City, S. Dak. 20th, Mount Saint Mary's, Md. 21st, Mount Saint Mary's, Md.; Milwaukee, Wis. 26th, Huron, S. Dak. 27th and 29th, Grinnell, Iowa. 30th, Mount Saint Mary's, Md.; Palestine, Tex. 31st, Grinnell, Iowa; Mount Saint Mary's, Md.

On the 17th auroras were observed from New England to the Dakotas and southward to Maryland and the Ohio Valley. The following are among the more notable displays reported:

Manchester, N. H., 5th: a diffused auroral light resembling the dawn of day was observed in the north from 7.30 to 9.30 p. m. Its color was a very light yellow tinged with crimson, and it rose to altitude 30° and extended from azimuth 145° to 220°.

Buffalo, N. Y., 17th: a faint auroral arch was observed from 8.20 to 8.50 p. m., being brightest about 8.40 p. m. The arch extended from 20° east of north to 15° west of north, and the elevation of the centre when the display was most brilliant was 25°. The arch broke in the centre at 8.43 p. m., and disappeared rapidly.

Sault de Ste. Marie, Mich., 17th: an aurora consisting of a well-defined arch of a light gray color, extending from 200° to 280° of azimuth and to 20° altitude was observed above a dark segment; a few streamers shot up to altitude 40°. The maximum brilliancy was about 2 a. m., 18th, and the display disappeared about 4 a. m., 18th.

Marquette, Mich., 17th: an aurora in the shape of a double arch of diffused white light was observed at 7.30 p. m. One arch extended from azimuth 130° to 225°, and the other from east to west-northwest, cutting the zenith. The display lasted until midnight.

Fort Buford, N. Dak., 17th: an aurora, consisting of a gray line, of irregular form, extending between northwest and northeast and to altitude about 20°, was observed at 8.55 p. m. Two streamers of a reddish tinge were observed, one near the centre, and the other near the eastern end of the display, which remained without material changes until 9.28 p. m. The aurora continued until 10.40 p. m., when it had entirely disappeared. The display was not clearly visible, as the northern horizon was partly obscured by clouds.

THUNDER-STORMS.

The more severe thunder-storms of the month are described under "Local storms." East of the Rocky Mountains thunder-

storms were reported in the greatest number of states, 16, on the 12th and 13th; in 10 to 15 on the 1st to 6th, 11th, 12th, 16th, 18th, and 19th; and in 1 to 9 on the 7th, 8th, 9th, 15th, 17th, 20th to 27th, 29th, and 30th. The 28th and 31st were the only dates on which no thunder-storms were reported.

East of the Rocky Mountains thunder-storms were reported on the greatest number of dates, 16, in Iowa, and Mo.; on 10 to 15 in Ark., Fla., Ill., Kans., La., Mich., Ohio, and Tex.; and on 1 to 9 in Ala., Conn., Ga., Ind., Ind. T., Ky., Me., Md., Mass., Minn., Miss., Mont., Nebr., N. H., N. J., N. Y., N. C., N. Dak.. Pa., R. I., S. C., S. Dak., Tenn., Vt., Va., W. Va., and Wis. West of the Rocky Mountains thunder-storms were reported as follows: Ariz., 1st to 4th, and 10th; Colo., 1st, 11th, and 20th; Nev., 10th; N. Mex., 1st; Utah, 2d, 7th, and 11th; Wash., 16th; Wyo., 1st. No thunder-storms were reported in Cal., Del., D. C., Idaho, and Oregon.

INLAND NAVIGATION.

STAGE OF WATER IN RIVERS AND HARBORS.

The following table shows the danger-point at the several stations; the highest and lowest water during October, 1890, with the dates of occurrence and the monthly ranges:

Heights of rivers above low-water mark, October, 1890 (in feet and tenths).

Stations.	Danger-point on gauge.	Highest water.		Lowest water.		Monthly range.
		Date.	Height.	Date.	Height.	
Red River.						
Shreveport, La	29.9	25, 26	7.3	13	5.5	1.8
Arkansas River.						
Fort Smith, Ark	22.0	25	11.2	6	4.2	7.0
Little Rock, Ark	23.0	27	12.4	8	7.8	4.6
Missouri River.						
Fort Buford, N. Dak	.....	10, 11	1.5	30, 31	0.4	1.1
Sioux City, Iowa	.....	2	4.5	20	3.6	0.9
Kansas City, Mo	21.0	16	4.5	30, 31	3.1	1.4
Mississippi River.						
Saint Paul, Minn	14.5	20 to 22	2.6	6	1.6	1.0
La Crosse, Wis	13.0	20	6.3	9, 10, 11	3.4	2.9
Dubuque, Iowa	16.0	25	7.6	10, 11	3.9	3.7
Davenport, Iowa	15.0	20 to 28	4.9	12, 13	2.3	2.6
Keokuk, Iowa	14.0	29, 30	4.8	14, 15	2.2	2.6
Saint Louis, Mo	32.0	22	9.4	17	6.7	2.7
Cairo, Ill	40.0	31	18.1	20	11.4	6.7
Memphis, Tenn	34.6	1	14.6	22	8.8	5.8
Vicksburg, Miss	41.0	2	22.9	26	13.0	9.9
New Orleans, La	13.0	6	6.4	28, 29	4.2	2.2
Ohio River.						
Pittsburgh, Pa	22.0	25	16.2	1	4.8	11.4
Parkersburgh, W. Va	38.0	27	23.2	4	6.9	16.3
Cincinnati, Ohio	50.0	30	32.9	1	12.0	20.9
Louisville, Ky	25.0	30	12.2	1, 2	6.3	5.9
Cumberland River.						
Nashville, Tenn	40.0	4	11.4	22	3.3	8.1
Tennessee River.						
Chattanooga, Tenn	33.0	27	9.5	16, 17, 18	3.7	5.8
Monongahela River.						
Pittsburgh, Pa	29.0	25	16.2	1	4.8	11.4

Heights of rivers—Continued.

Stations.	Danger-point on gauge.	Highest water.		Lowest water.		Monthly range.
		Date.	Height.	Date.	Height.	
Savannah River.						
Augusta, Ga	32.0	1	28.5	16	7.1	21.4
Willamette River.						
Portland, Oregon	15.0	2	2.7	8	0.2	2.5

FLOODS.

Reports of the 12th show that great damage was caused to crops, railroad, and other property in West Virginia by freshets in the Monongahela and Little Kanawha rivers and tributaries. At Glenville, W. Va., the Little Kanawha had risen 25 feet by the 13th, washing away large quantities of hay, corn, and lumber. At Parkersburgh, W. Va., the Ohio River rose 11 feet from the 13th to 15th, on which latter date it stood 21.1 feet on the gauge. The Connecticut River was unusually high on the 21st. The Roanoke River was rising rapidly at Weldon, N. C., on the 23d; on the 25th the water covered low ground; and on the 26th the water began to recede. A freshet was reported on the 26th in the Wyoming Valley, in the Susquehanna River basin, Pa. On the 29th high winds, together with a freshet, caused the Cape Fear River to flood its banks near Wilmington, N. C., inundating rice fields, sweeping away rice stacked in the fields, and flooding lower floors of stores on Water street in Wilmington. At Mossing Ford, Va., the excessive precipitation of the month caused the overflow of small streams.

MISCELLANEOUS PHENOMENA.

SUN SPOTS.

Haverford College Observatory, Pa., (observed by Prof. F. P. Leavenworth):

Date.	Number of new—		Disappeared by solar rotation.		Reappeared by solar rotation.		Total number visible.		Faculæ.	Remarks.
	Groups.	Spots.	Groups.	Spots.	Groups.	Spots.	Groups.	Spots.	Groups.	
Oct., 1890.										
1, 9 a. m.	0	0	0	0	0	0	1	28	0	Definition fair; spots small.
3, 11 a. m.	0	0	0	0	0	0	0	0	2	Definition fair.
4, 10 a. m.	1	2	0	0	0	0	1	2	5	Definition good.
5, 3 p. m.	1	12	0	0	0	0	2	14	2	Definition good; spots small.
8, 9 a. m.	0	0	0	0	0	0	1	1	2	Definition good; spots small.
10, 11 a. m.	1	1	0	0	0	0	1	1	2	Definition fair.
11, 10 a. m.	1	4	0	0	0	0	2	8	2	Definition fair.
14, 4 p. m.	0	0	0	0	0	0	1	2	1	Definition poor.
15, 10 a. m.	0	0	0	0	0	0	0	0	2	Definition poor.
17, 9 a. m.	0	0	0	0	0	0	0	0	2	Definition fair.
18, 10 a. m.	0	0	0	0	0	0	0	0	1	Definition good.
25, 10 a. m.	1	50	0	0	0	0	1	50	....	Definition partial through clouds.
26, 9 a. m.	0	0	0	0	0	0	1	40	1	Definition poor; large double spot.
27, 2 p. m.	0	0	0	0	0	0	1	24	0	Definition fair.
28, 9 a. m.	0	0	0	0	0	0	1	8	2	Definition poor.
29, 2 p. m.	0	0	0	0	0	0	1	16	3	Definition poor.
30, 10 a. m.	0	0	0	0	0	0	1	2	3	Definition fair.
31, 10 a. m.	0	0	0	1	0	0	1	4	3	Definition fair.

Mr. D. E. Hadden, Alta, Iowa: 1st, 1 group, 2 spots; small faculæ nw. 2d, faculæ on nw. limb. 6th, 1 group. 14th, faculæ near w. limb. 16th to 18th, clear disc. 19th, 1 group, 3 spots on se. limb, with faculæ. 20th, 1 group, 6 spots; 3 new spots, and group of faculæ on e. limb. 21st, 1 group, 6 spots, 3 spots large, with faculæ surrounding. 22d, 2 groups, 11 spots. 23d, 2 groups, 17 spots; 1 spot large, and the others small. 24th, 2 groups, 15 spots. 25th, 1 group, observation incomplete, clouds. 26th 1 group, 1 large spot; could not count spots, hazy. 30th, 1 group, 2 spots; faculæ in nw. 30th, 1 spot disappearing by rotation on w. limb; hazy. Cloudy on 3d, 5th, 8th, 13th, 15th, 27th to 29th.

Mr. John W. James, Riley, Ill.: 1st, one new group near west edge. 3d, no spots seen, but broad areas of faculæ on west limb. 7th to 17th, observations on 7 days but no spots seen. 19th, faculæ on east edge, followed on 20th by a fine large group, estimated 52,600 miles long, one large spot 26,300 miles diameter, and about 20 small spots. 24th, a new group southeast of large spot. 27th, all the small spots gone; faculæ in their place; the large spot, still intact, disappeared by solar rotation November 1st.

Mr. C. E. Buzzell, Leaf River, Ill.: 6th and 7th, small group in south latitude. 14th, small spot in south latitude near meridian. 19th, large group at east limb which completed the transit. Observations not taken on many dates on account of clouds.